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ORTHOPEDIC TREATMENTS IN NEUROLOGICAL CASES.*

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There are no two other specialties so interlinked as those of neurology and orthopedics. Excluding the purely orthopedic cases (as diseases of bones, infectious arthritis, flat feet, rickets, etc.) and excluding the mental diseases, there is a great group of cases that is usually treated by either of the two specialists or when treated by one, requires also the assistance of the other It is for the benefit of every orthopedic surgeon to have a fair neurological training. Of course, he may omit the mental diseases. Similarly every neurologist should have a fair knokledge of the principles of orthopedics. This point is not yet well emphasized and we still find in our orthopedic text-books very short chapters on neurological diseases, and vice versa. Many orthopedic hospitals have no neurologist on their regular staff and the neurological hospitals send for an orthopedic surgeon only when they have to put on a corset for a fractured spine.

Almost every orthopedic surgeon can cite scores of cases brought to him on account of inability to walk dating from birth or developed at a later age, and the examination revealed to him a purely neurological condition. Even general medical men will send a case to the orthopedic surgeon to ask for some advice to check the disabilities and the discomfort following the ailment, though they know that the disease is purely neurological and incurable.

Another example of the necessity of cooperation is found in the physical remedies, *e.g.*, thermotherapy, massage, hydrotherapy, re-education, etc., ordered by the neurological department, but the details of their application are better known to the orthopedic surgeon.

The electrical treatments are mentioned in the orthopedic text-books but are more scientifically applied in the hands of the neurologists.

We orthopedic surgeons feel that it is our duty to bring before the neurologists the great help we can offer to their specialty in helping in their treatment of many of the deformities and disturbed muscular balances that come under their care. It is also desirable that orthopedic surgeons take a deeper interest in neurology and further extend their scientific investigations to that fertile field as this will advance the specialty in which we are all interested.

This paper is based largely on work carried on for the last ten years at the Montefiore Home and Hospital and for the last five years at the Fordham Hospital, New York. In the former institution, the investigations were conducted by Dr. G. R. Elliott (the attending Orthopedic Surgeon) and myself, the cases being referred from our extensive neurological service by the neurologists, particularly by Dr. S. Wachsmann and Dr. Isidor Abrahamson. At the latter institution the work was cooperatively carried on by the neurological surgeon, Dr. A. S. Taylor and the neurologist, Dr. J. Byrne, and myself. The results of some of the investigations are already published, some are in preparation, and much is still incomplete. In both institutions we have obtained results that would have been impossible had there not been this close cooperation of neurology, neurological surgery and orthopedic surgery

I hope, therefore, that this short paper will serve as a plea for and a stimulus to further investigation.

Before proceeding with detailed discussions of the diseases, a few facts common to both specialties and of great interest in a paper of this kind ought to be stated and elucidated.

MUSCULAR ACTIVITY OR TONICITY

According to Barker[2] (in his *"Monographic Medicine"*) muscle tonus is in part a variety of reflex, in part a conscious or sub-conscious innervation for the purpose of maintaining attitude. By it is understood to be an ever continuous feeble state of contraction in which the voluntary muscles are maintained during life.

This tonus appears to be maintained largely by afferent stimuli coming from the muscles, tendons,

*Read before the Montefiore Clinical Society, April 11, 1919.

fascia and periosteum to the spinal cord where the impulses are transferred to the lower motor neurons, stimulation of which contracts the muscles concerned. The intensity of the tonic innervation is dependent not only upon the innervation in the lower reflex arcs, but also upon favoring and inhibiting influences arriving from higher neuron systems within the spinal cord and brain. The tonus is, therefore, increased in certain muscles where the pyramidal tract is injured.

Barker[2] further adds: "Recently a strong reaction against prevalent conceptions of muscle tonus has set in. It is maintained (1) that there is no such thing as a general "contraction" of muscles when at rest. (2) That which has been called tonus is a coordinative performance that calls forth a certain attitude by means of finely graded contractions. This new doctrine avoids the term 'tonus'."

In following the two excellent books by Colin McKenzie,[19] and Bowen and McKenzie,[4] recently published, one can get a good idea of muscle tonus though the conclusions are quite often contradictory.

In disturbances from the normal tonus there may be: (1) Atony, or hypotony when the tonus is absent or markedly diminished, and this is met in tabes dorsalis (due to loss of the sensory limb of the reflex arc), in flaccid paralysis as anterior poliomyelitis (due to the lesion of the motor limb of the reflex arc) and dengenerative arthritis, (due to relaxation of ligaments and changes in the muscles).

(2) The converse of the above condition is hypertony or abnormal muscular rigidity, met in the congenital spastic paraplegia, multiple sclerosis, Friedrich's ataxa or the muscular rigidity found in affections of the pyramidal tract, tumor of the cord, or in all acute joint lesions (?). It will be worth while to bear in mind that Parkinson's disease or paralysis agitans produces a peculiar hypertony of unknown origin and that rigidity is often a more marked feature than the tremor of the disease and this is responsible for the clumsiness of the movements and for mask-like rigidity of the face. We observed at Montefiore Hospital that the general appearance of the face in paralysis agitans and in chronic infection or proliferative arthritis shows marked similarity (Figs. 1-6). Spiller,[20] favoring the toxic theory for paralysis agitans, really finds a strong resemblance between paralysis agitans and some forms of what was known as rheumatoid arthritis.

(3) Another manifestation of abnormal muscle tonus is that met with in myotonia congenita (Thomson's disease) in which the patient, on attempting to perform a movement, is often unable to do so on account of a suddenly appearing hypertony in the muscles concerned.

(4) The reverse of this disease is amyotonia congenita, met in small children. It is a condition of extreme flaccidity and atony of the muscles, espe-

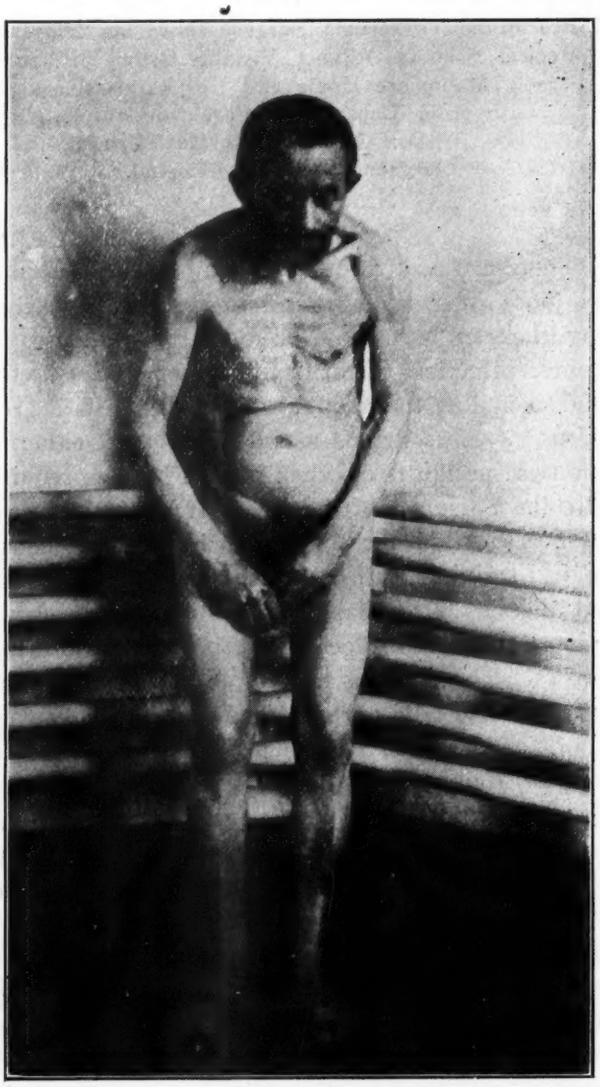

Fig. 1—A case of paralysis agitans. Note the facial expression and the kyphotic position. (Montefiore Home and Hospital.)

cially of the lower extremities. (Fig. 12.) Here the hypotony, as in progressive muscular atrophy, seems to be due to a primary "motor" anomaly, not to injury of the sensory limb of the arc as in tabes.

(5) Dystonia musculorum deformans or tortipelvis is a peculiar condition only recently described. In this there is a marked hypertony with spasm affecting certain groups of muscles, especially those of the pelvic girdle, causing the so-called "dromedary gait." (Figs. 13-14.)

DISTURBANCE OF MOTILITY OF STRIPED MUSCLES

Both the orthopedic surgeon and the neurologist examine for the normal motion of the muscles, active and passive, with and without resistance, though the latter frequently calls the electrical apparatus to his aid, while the former never resorts to it. Abnormal motions are manifested either by paresis (or hypokinesis) when there is only a partial inability to perform active movements and in such

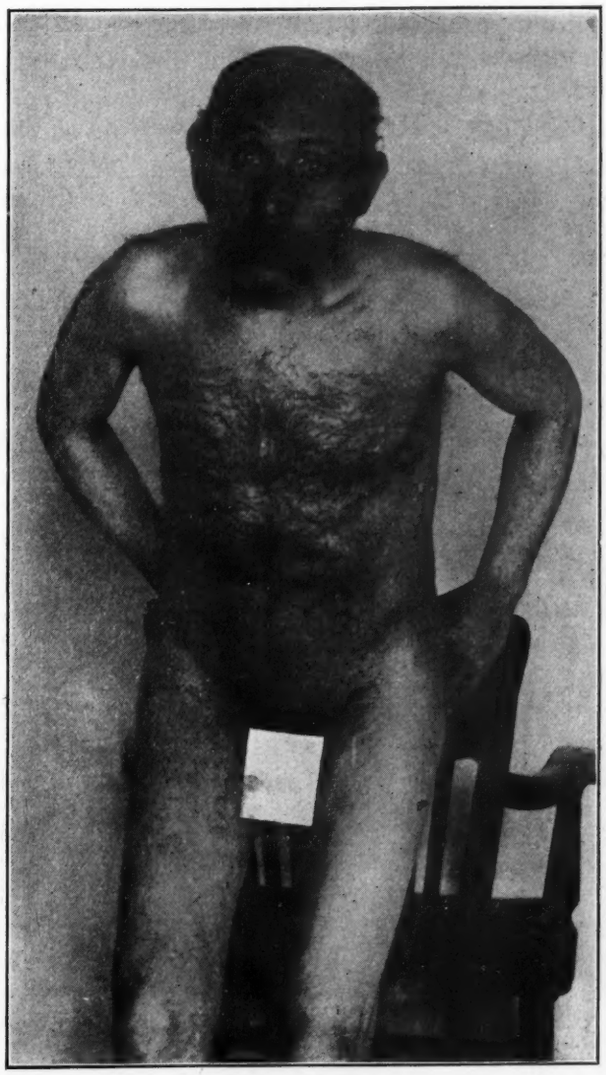

Fig. 2—A case of spondylitis deformans. Compare the facial expression and the kyphotic spine with that of Fig. 1. (Montefiore Home and Hospital).

incidents the neurologist is probably better equipped for the diagnosis, while the orthopedic surgeon is more competent to help restore normal fnuction and particularly to prevent the muscles from being overused.

When there is total inablity to perform active movements it is known as paralysis or akinesis. This group, of course, is well-known and both the flaccid variety, when the tonicity of the muscles is less than normal, as in anterior poliomyelitis, and spastic conditions, when the tonicity is greater than normal, as in spastic paraplegia are treated by the orthopedic surgeon though the neurologist still holds tightly to them.

Under paralysis one must include not only the atrophic, but also the non-atrophic found in dystrophies, etc.

Contrary to the forms thus far discussed, there are cases that present involuntary contractions (or hyperkinesis) due to motor irritation, either through increased physiological stimuli or through pathological stimuli or pathological irritation of the motor neuron system. The orthopedic surgeon meets very often muscular spasm that is really pathological permanent contraction arising reflexly

Fig. 3—Facial expression of a patient with paralysis agitans. (Montefiore Home and Hospital.)

through purely quantitative increase of physiological stimuli.

We shall skip over the tremors, tics, athetosis, and dwell shortly on three forms of hyperkinesis. (1) Synkinesias or associated movements, *i. e.* on moving one limb the other may move, hence in hemiplegics the good hand will close while attempting to close the paralyzed one. This phenomenon was utilized by us in giving exercises to hemiplegics by ordering them to move both sides simultaneously.

(2) Continuous contraction as a response to stimuli known as "tonic" should receive orthopedic attention, as this state responds rapidly to the application of plaster casts and braces.

(3) When the contraction is rhythmical or intermittent, it is called "clonic."

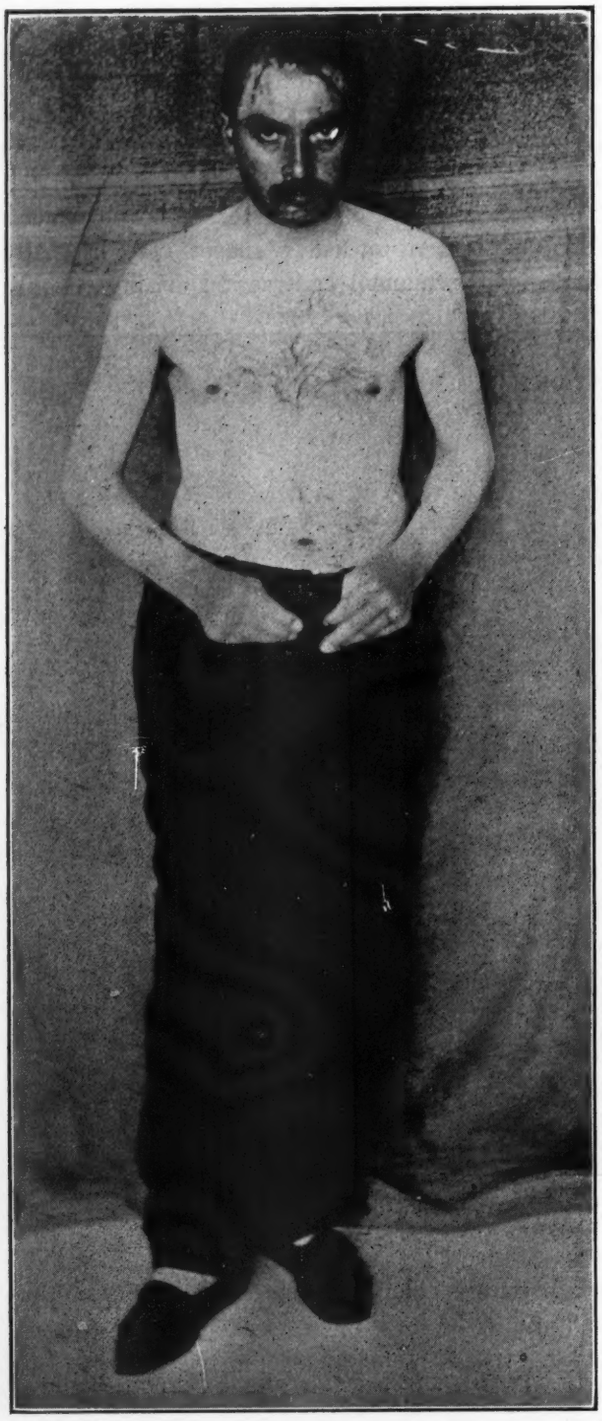

Fig. 4—Patient with parlysis agitans. (Montefiore Home and Hospital.)

Under this head of hyperkinesis come also the occupation cramps, as writers' cramps, piano players' cramps, etc.

Another phenomenon of disturbance of motility is that of co-ordination varieties of which can all be grouped under one heading, "ataxia." (The neurologists differentiate between peripheral and spinal, vestibular, cerebellar and cerebral ataxias. The orthopedic surgeon usually sees only the Spinal form, but he must consult the neurologist as to whether or not it is one of the other forms.)

THE GAIT

I do not think it is necessary here to review in detail the normal gait with its three periods: swinging forward, support and shoving the body forward.

The abnormal gaits of interest to us are (a) the paretic, or paralytic, where walking is slow, steps shortened and the legs are dragged. This gait is found in polyneuritis, anterior poliomyelitis, diphtheritic paralysis and muscular atrophies. (b) The spastic gait, in which the patient walks with small leaping steps, knees held stiff, foot in lanter flexion and toes tending to stick to the floor. This gait is found in organic hemiplegia and cerebral diplegia. (c) The ataxic gait, found in tabes and Fredrich's ataxia is well-known.

Fig. 5—Patient with infectious polyarthritis. (Montefiore Home and Hospital.)

There are other forms of abnormal gait which, however, are not of interest to us here.

General Outline of Methods of Examination and Treatment in Neurologigal Cases Requiring Orthopedic Care

It is not necessary to review all the steps of examination of neurological or orthropedic cases. I shall only state briefly that in cases that come on the border-line, a combined examination should be made. While the orthopedic surgeon may be able to examine roughly the muscular action, the neurologist can better tell even where only paresis exists. The outline for neuro-muscular examination, suggested by the American College of Surgeons can be advantageously used in such cases.*

A consultation could then be held (as Drs. Taylor, Byrne and myself are accustomed to do) and the course to be taken decided upon. If any operation is to be performed, it should be by both surgeons together, all the after-treatments to be carried out by the orthopedic surgeon. The re-examinations should be by the neurologist and not in the presence of the orthopedic surgeon; thus an unbiased opinion can be given. We found this method of procedure quite advantageous.

As far as treatments are concerned, a few general rules can be laid down while all the details can be discussed later on.

(1) A partially weak muscle should be guarded against stretching and overuse. This will frequently help to restore normal function and also prevent further damage. Rest even in braces and plaster should be carried out for a long time. The value of this rule is seen in the treatment of anterior poliomyelitis, polyneuritis, peripheral nerve surgery, diphtheritic paralysis, myasthenia gravis, etc.

(2) Prevent the deformities. It is more important in the neurological cases, as in purely orthopedic cases, the orthopedic surgeon always guards against it. This should be used more often in cases of dystrophies and myopathies, than it has been used until now.

(3) Braces and plaster should be used freely in all neurological cases though they cause atrophy which the neurologist dreads so much. Many of the disadvantages in incurable diseases can be avoided altogether, or progress of the diseases checked.

(4) The application of plaster must be with greater care than in ordinary orthopedic cases as usually the sensation is diminished and the hypertonicity is usually severe. There may, therefore, more often develop pressure sores which will be resistant to treatment.

(5) Braces, massage and exercises should be used where there is even only slight hope of improvement as the cases in neurology are very rare in which these methods are harmful.

Fig. 6—Patient with infections polyarthritis. Note the similarity of the faces in Figs. 3, 4, 5 and 6.

(6) Hydrotherapy, thermotherapy, phototherapy and heliotherapy are freely employed in such cases, while electrical treatments, except the Bristow coil, appear to be valueless to the orthopedic surgeon.

(7) The use of orthopedic supports in hysterical cases requiring really psycho-analytic methods must be discriminately guarded against as this may increase their attention to the abnormality. Their use, however, is justified in cases where organic

*The following is taken from the Bulletin of the American College of Surgeons, Vol. IV, No. 1:

Motion: Note gait, paralysis, spasms and tremors, coordination.
Sensation: Note insensibility to pain, touch, heat and cold, muscle sensation; sense of movement, positions, Romberg's sign.
Reflexes: Pupils, normal reflexes, Argyll-Robertson pupil, dilatation, contraction, contraction with irregular outline, tendon reflexes, biceps, triceps, scapulo-humeral, radial, patellar, Achilles, skin and muscle reflexes, epigastric, abdominal, cremasteric, Oppenheim, plantar, Babinski.
Muscles: Atrophy, hypertrophy.

disease existed and the patient has not regained full self-reliance and these will quickly aid them in recovery, *e. g.*, in tabes where a plaster cast on the knees will be of benefit.

I shall now discuss the treatment of special diseases.

I. TREATMENT OF HEMIPLEGIA

The deformities of adult hemiplegia, whether due to embolism, thrombosis or apoplexy are well known, yet how seldom does one try to prevent the development of these disabling deformities. It is taken

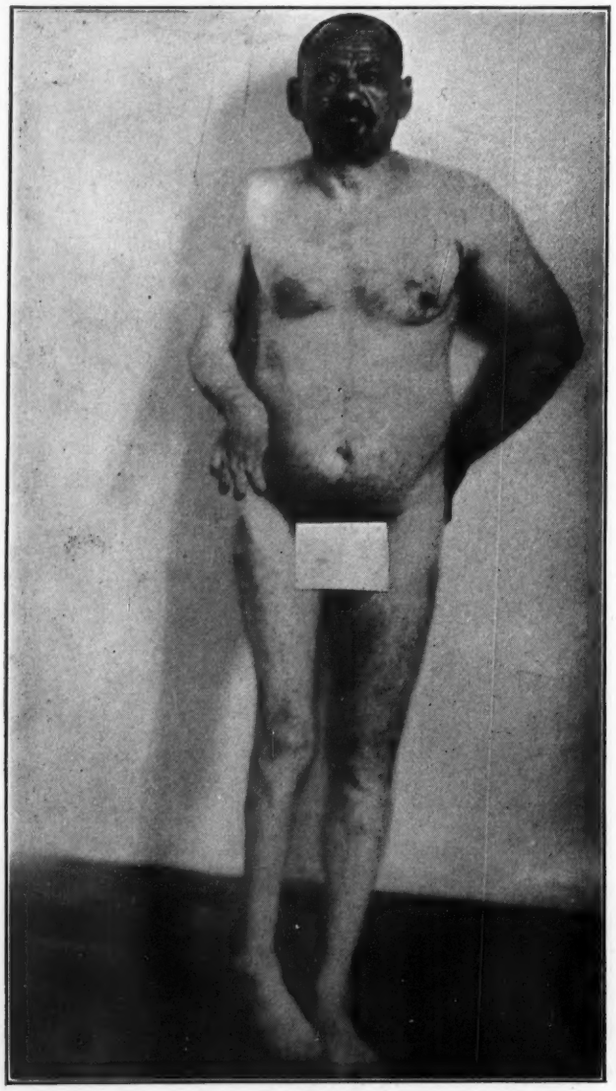

Fig. 7—A patient with hemiplegia of twenty-one years' duration, who after receiving orthopedic treatments was able to walk. Notice the fair musculature of the paralyzed limb, which has increased since being used. The upper extremity in this position without much effort. (Montefiore Home and Hospital).

as a matter of course that they cannot be prevented and once developed cannot be improved. Even the text-books on neurology do not emphasize enough the necessity of avoiding contractions. Some do mention that splints should be applied, but neither is its importance impressed upon the reader, nor are the details of application given. Even such an extensive system as "Modern Treatment of Mental and Nervous Diseases,"[35] does not put much stress on this principle.

In the neurological service of Montefiore Home and Hospital, where we always have about sixty to seventy patients with hemiplegia I have not met even one patient who gave a history of having been

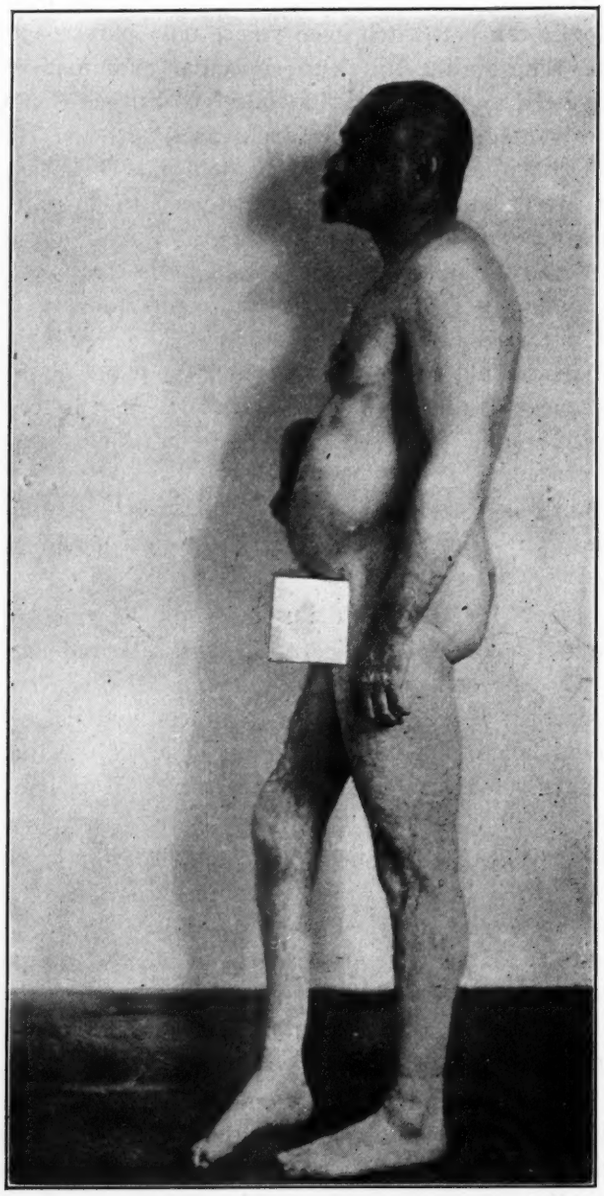

Fig. 8—Same patient as in Fig. 7. Note the excellent position of the feet and the slight flexion of the knee.

watched by his attending physician immediately after the apopletic attack for contractures. It is there where my interest was first aroused to these cases. Dr. Elliott and myself found that not only in the early stages can the contractures be remedied but even in old and neglected hemiplegics, great improvement can be obtained. We have there treated a practically bedridden invalid with marked de-

formities, *i. e.*, flexion of the thigh on the abdomen, leg on the thigh and the foot in marked talipes equino-varus, of twenty-one years' standing, and succeeded in making him walk. He is able now to walk for a considerable length of time. We reported the case in detail in the *Journal of the American Medical Association.*[12]

That, to our knowledge, was the first case on record of improvement after so long an interval. Franz, Shutz and Wilson,[14] have done similar work on hemiplegics and reported good results.

Since our first case, we have conducted investigations in the early cases of hemiplegia, especially in Fordham Hospital, where patients are frequently brought in by the ambulance immediately after the attack. We have found that the principle used in anterior poliomyelitis can be applied here and all the deformities can be prevented by the application of plaster splints or braces as early as possible, even on the second or third day. In hemiplegia it is still more important to apply the support so early because of the rapid development of hypertonicity of certain muscles. The stretching of the antagonistic muscles is therefore greater than in anterior poliomyelitis. In cases watched by us, we noticed that it was much harder to apply the supports even on the tenth day, due to the marked muscular spasm and hypertonicity, favoring early contractures. Since then we have applied the plaster cast or brace on the second or third day with full gratification.

For the lower extremity, the plaster cast extended to the perineum with the foot at right angle to prevent talipes equino-varus. The knee was put in full extension to guard against contraction, and also against hyperextension. The hand was put in hyperextension at the wrist joint and flexion at the metacarpophalangeal joints. The elbow was kept in straight or semiflexed position as the tonicity of the elbow flexors is great. The casts were changed on the tenth day for removable ones when massage, exercises, etc., were started.

It may be worth while to mention that the famous orthopedic surgeon, Hoffa, distinctly recommended the use of splints in hemiplegic paralysis of the leg, with elastic bands for the deficient flexion of the knee and the dorsal flexion of the foot.

In all the early cases that came under our observation we were successful in preventing the occurrence of the deformities and obtained very early return of function. It is really remarkable to note the great benefit we can obtain by these simple methods that all of us are using in anterior poliomyelitis but are very seldom called for to help the hemiplegics. In the old and neglected hemiplegics the deformities are of course corrected.

In administering massage, we made use of the experiments and conclusions of Oden,[23] applying effleurage for the contracted or spastic muscles, while for relaxed and atrophied muscles petrissage and tapotement were resorted to.* In early cases we began massage in the third week, though Bucholz urges earlier massage.

Regarding the time to commence exercises in early cases, there is a variey of opinion. H. Oppenheim[24] discourages early movements, waiting six weeks. Others begin earlier. In reality no specified time can be given, each case being considered individually in relation to its sensitiveness, the amount and character of the contractures. We have started exercises on the third week with encouraging results.

Regarding the forms of exercises, we made use of the priciple of synkenesis and performed symmetrical exercises, *i. e.*, the good limb performed at the same time the same motions as expected of the bad limb. It may be advisable to perform these exercises in front of a mirror. We began with five to ten minutes daily and increased to fifteen minutes twice a day. (By consulting Frenkel's book on tabetic taxia, one gets a proper understanding how to teach these patients the proper way of walking, sitting down and getting up.) In the old cases Zander's machines are fully resorted to.

Electrical treatment is still used by some. In our opinion it is of very little benefit and perhaps even harmful, as it will increase the tonicity.

At Fordham Hospital, Drs. Taylor, Byrne and myself have performed early surgical operation in the skull, *i. e.*, decompression and evacuation of the clot, (Hudson operation). This was done even on the second day after the attack and without an anesthetic. The results were extremely gratifying. We demonstrated some of our cases before the New York Neurological Society and gave all the details of the method (the paper has been submitted for publication).

Of course, in infantile hemiplegia one may expect better results if treated early. I am not taking in consideration the mental defficiency of these cases, which materially retards the improvement.

If the cases come to us with the deformities already present, they can be treated under the same principles as those occurring in anterior poliomyelitis or spastic paraplegia.

*I am using the terms advocated by Bucholz in his book "Therapeutic Exercises and Massage," and not the terms advocated by Oden.

(Speech disturbance in right sided hemiplegia should be treated by the modern methods of speech re-education.)

II. TREATMENT OF ANTERIOR POLIOMYELITIS

The success of orthopedic treatments in anterior poliomyelitis is so well established that I do not have to mention at all what can be and is done for them. All the principles used in anterior poliomyelitis can be applied to polyneuritis and diphtheritic paralysis. A good review of all the details of treatment can be found in Lovett's book[18] or that of Ruhräh and Mayer.[25]

Fig. 9—A patient who had hemiplegia for one and a half years and developed contractures of hand and knee. After a decompression and evacuation of a cyst (Hudson operation) followed by orthopedic treatments, she made a rapid recovery. Note the good position of the limbs.

III. TREATMENT OF SPASTIC PARAPLEGIA AND ORGANIC LESIONS OF THE SPINAL CORD.

In an excellent paper by Drs. Blahd and Stern at the last meeting of the Orthopedic Section of the American Medical Association, all the various methods of orthopedic treatments in cerebral spastic paraplegia were so ably stated that I cannot do more justice than refer the reader to that article.[5] They have shown distinctly that if there is any hope, the orthopedic surgeon is the one to be the principal guide.*

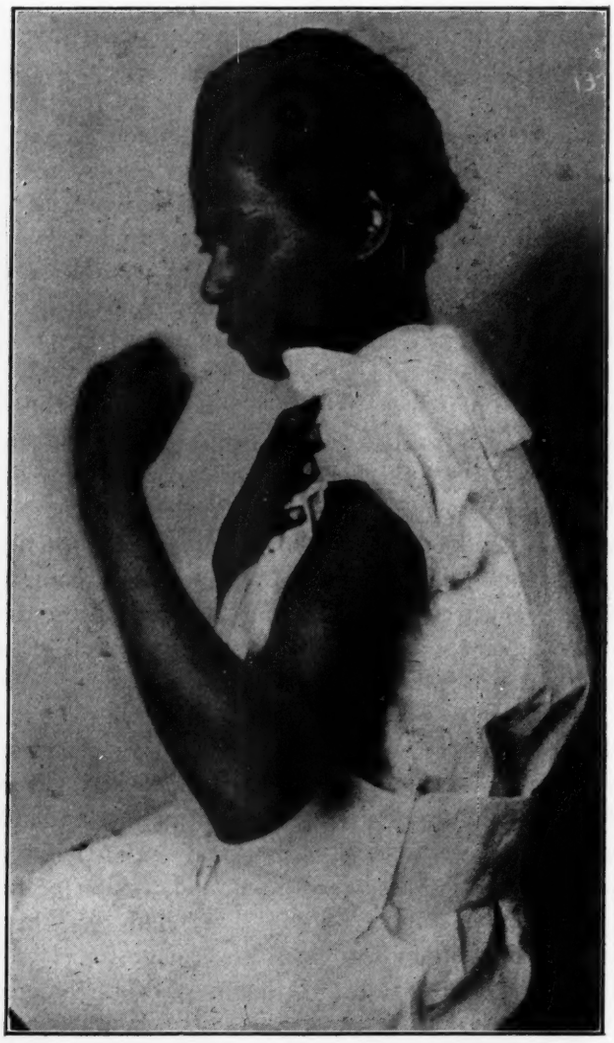

Fig. 10—A patient with hemiplegia treated by decompression and evacuation of clot (Hudson operation) and orthopedic treatments showing the good musculature and absence of contractures.

*In a brief outline they give the following courses of operative procedures:

1. Muscle and Tendon Operations:
   (a) Forcible redressment and overcorrection.
   (b) Tenotomy.
      1. Subcutaneous.
      2. Open.
   (c) Tendon lengthening.
      (1) Subcutaneous.
      (2) Open.
   (d) Muscle resection.
   (e) Tendon transplantation.

Whatever applies to cerebral spastic paraplegias applies largely to organic lesions of the cord producing spasticity of the limbs, such as tumor of the cord.

In this connection we can mention also tabes dorsalis. Though the disease is incurable, it has been shown that application of braces or plaster casts to the knees makes the patient feel so much more certain that the gait is improved and the occurrence of fractures is prevented. One must remember that the tabetic is uncertain of the position of his limbs and is therefore afraid to walk and the brace gives him security. It is hard, however, to influence a tabetic to wear a plaster cast.

Where Charcot's joints are present, only apparatus has to be resorted to. For exercises one can use Frenkel's or Maloney's system.

For multiple sclerosis, which is another organic spinal disease, very little can be done; however, slight benefit is obtained by light massage and the re-educational exercises of Frenkel.

Pressure paralysis due to Pott's disease is always treated by orthopedic methods.

IV. Treatment of Birth Palsies.

Birth palsies or what is commonly known as Erb's palsy has only lately been referred to the orthopedic surgeon, due to the excellent work and advocacy of Sever.[31] Unfortunately, the cases are referred to us late, when the deformities are marked and the atrophy of the muscles due to disuse and overstretching is intense. If we could get the cases early, say at the first or second week and treat them as we treat anterior poliomyelitic cases with supports to guard against further injury and stretching, one can expect very good results. In my series of cases of Erb's palsy treated in the last two years, five patients were brought to me at the early age of a few weeks. (One of them was bilateral.) They have been treated with a plaster cast to hold the arm in an abducted, elevated and outwardly rotated position with the hand supinated. This support was maintained between massage and exercises. No electricity was used. One patient made a complete recovery in six months. The other with the bilaterial palsy had one hand completely cured in two months while the other hand was cured after six months. The third child who came at the age of three months has not shown sufficient improvement after two months' treatments and was then operated on by Dr. Taylor and myself—an operation on the plexus and a Sever operation on the contracted muscles. The result was very gratifying. The other two children are still under treatment and are improving rapidly. (I expect to publish soon my series of cases of Erb's palsy).

I believe that in this class of cases the co-operation of the neurologist, neurological surgeon and orthopedic surgeon is very clear. The neurologist is best qualified to determine the injury and its location; then either plaster is applied or an operation can be resorted to. He can also give the correct interpretation of the improvements.

Fig. 11—Same patient as in Fig. 10, showing the proper dorsal flexion and absence of contractures.

V. Treatment of Peripheral Nerve Injuries.

During this war, it became a practice to call on the orthopedic surgeon for help in these cases to apply a brace or plaster before the nerve operation and keeping it up for a long time afterwards to guard against overuse of the denervated muscles and also against overstretching. Mayer[22] gives

(f) Muscle implantation.
2. Brain Operations:
   (a) Trephining and evacuation of blood clots.
   (b) Decompression.
   (c) Excision or evacuation of cysts or tumors.
3. Motor Nerve Operations:
   (a) The causation of temporary paralysis by means of various injections (Allison's method).
   (b) The partial resection of the motor nerves leading to the spastic muscles (Stoffel's operation).
4. Centripetal (Sensory) Nerve Operations:
   (a) Resection of the posterior nerve roots (Foerster's operation).

careful details of the combined method. Stookey[27] has also emphasized this part of the treatment to peripheral nerve injuries. It is useless to bring before you the difference between this combined method and that previously used, when the nerves were sutured and the after-treatments left to nature or ignorant masseurs.

Volkman's ischaemic paralysis is best treated by orthopedic methods and the result obtained by Jones' method is well-known and needs no repetition[34] and [40].

Those conditions diagnosed until now as sciatica are of course mainly conditions arising in the sacro-iliac joints and many of these incurable patients have been relieved as if by magic by the simple application of a sacral compressor.

Fig. 12—A case of amyatonia congenita. The child is eleven years old, never walked. From sitting, the feet, knees and hips became contracted in the position seen in the photograph. (Montefiore Home and Hospital).

Many of the pressure symptoms due to an enlarged transverse process of the last lumbar vertebra have been cleared up by the removal of the offending transverse process.

VI. TREATMENT OF THE MYOPATHIES, *i.e.* MUSCULAR ATROPHIES, DYSTROPHIES AND DYSTONIAS.

Abrahamson[1] gives careful details of the orthopedic treatments in these incurable conditions. He based his conclusions mainly on results obtained in the Montefiore Home and Hospital, where we have a great variety of these cases. To quote Abrahamson in short about primary myopathy: "Those who are confined early to chairs do far worse than those in whom locomotion is possible. Where a weakness of the spinal muscles incapacitates the patient, proper braces or support are important and these will do much to arrest the spread of the disease. Massage and passive movements are important. Overexertion must be carefully guarded against. Where contractures exist, tenotomies can be used. Tendoplasty and tendon transplantation are of little value. Shortening of tendons is rarely of service. Use splints to prevent contractures. Nerve transplantation is useless." It is needless to remind you that very seldom is the orthopedic surgeon consulted. The neurologists are still forgetting these principles and these patients are allowed to become worse.

Progressive muscular atrophy gives very flail joints which should be guarded against by braces, etc. Abrahamson states: "A skilled orthopedic surgeon is able to overcome many of the disabilities and render possible a considerable amount of exercises by the patient himself."

Figs. 13, 14—A case of dystonia musculorum deformans. Note the marked contractions. (Montefiore Home and Hospital.)

About the dystonias we had not enough experience as yet to say whether they will improve or not.

CONCLUSIONS

1. Orthopedic surgery is a great aid to neurology and vice versa, if proper coordination between the two specialties is used.

2. In all cases that come on the borderline, a combined examination should be made and the course to be taken decided upon. The operation, if any, should be done by the orthopedic and neurological surgeons, the after-treatments are carried out by the orthopedic surgeon and the re-examinations by the neurologist.

3. Almost all neurological diseases lead to deformities and these should be guarded against. The orthopedic treatments will not only save many disabilities, primary or secondary, but also hasten a cure, if such is possible, and check the disease.

4. The principles of braces or plaster employed in anterior poliomyelitis can in general be used in hemiplegia, polyneuritis, peripheral nerve injuries, Erb's palsy and the myopathies.

5. Braces, massage and exercises should be used where there is even only a slight hope of improvement, as those cases are very rare in neurology when these methods are harmful. These, however, must be used intelligently. They should be used very cautiously in hysterical and functional cases.

6. Birth palsies, peripheral nerve injuries and hemiplegia should receive early orthopedic treatments and the bad deformities will not occur.

7. In the myopathies, the application of braces will prevent the occurrence of these distressing deformities and prevent the stretching of some muscles, which is a great factor in the deficient function. It also prevents overuse of the weakened muscles.

8. Re-education of muscular action is the most useful part in proper treatments of the neuro-muscular diseases.

I wish to express my sincerest thanks to Dr. Wachsmann, the Medical Director of Montefiore Home and Hospital for permission to make free use of the material at the Home, and to Drs. Taylor, Byrne and Elliott for co-operation in carrying out some of the observations made in connection with this work.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, JULY, 1919

SALUTATORY.

With this issue of the JOURNAL the editor resumes his duties after a lapse of eighteen months occasioned by military service. This break, though a long one, was the first in the service he has endeavored to give to the readers of the AMERICAN JOURNAL OF SURGERY since its initial appearance in April, 1905. In the continuance of that service he hopes to bring to bear whatever broadened outlook a first hand experience with the activities and emotions of war and with war surgery—at the front and in a large base hospital—has given to so much of the art and the science of surgery, as he may have learned in the years of his civilian practice.

The editor wishes to express his grateful appreciation of the loyal services of the various members of the JOURNAL staff in carrying on its work in his absence. Especially he and our readers are under obligation to Dr. Ira S. Wile who, in addition to the conduct of his own department, "Surgical Sociology," so well filled the post of editor-in-chief. Dr. Wile is not a surgeon but he is an experienced medical journalist, and a medical sociologist of national repute; and he has been in touch with surgical literature and with the activities of the JOURNAL through the unique department therein which he established nearly ten years ago. That valued feature of the JOURNAL—the accomplishments of which Dr. Wile modestly summarized in the last issue—will continue under his guidance. While he is quite able and willing to supply all the material needed to fill as much space as we can usually spare for "Surgical Sociology," we have no desire to make that department exclusively editorial. Its columns are open for contributions and discussions, which, indeed, it is part of its purpose to encourage.

The engagement of so large a percentage of the profession in the military service has caused, in the last two years, a great shrinkage in the number of articles contributed to medical journals. With the return of these men—and women—to civilian practice and the lessening of the burden that fell, in their absence, upon the others, contributions will presumably soon regain ante-bellum proportions, and we have no doubt that the AMERICAN JOURNAL OF SURGERY will be favored again as abundantly as before. The editor has heretofore rejected a large percentage of the articles submitted as falling below the standard he has adopted for his readers and, in their interest, he hopes to continue this beneficent practice. The JOURNAL aims to be a "magazine of practical surgery in all its branches" but it seeks also to be representative of the best in the progress of clinical surgery and surgical therapy.

War conditions have hampered much the department of abstracts, not only in respect of foreign journals but also, in no small measure, of American publications. These difficulties will gradually disappear with the return of peace. In addition we are putting in operation a plan that will, we believe, greatly improve this department, so that it will furnish each month a résumé of recent surgical articles of importance or of clinical interest gleaned from the various medical journals of this and other countries.

In resuming the literary cares and responsibilities of the JOURNAL the editor bespeaks a continuance of the indulgence with which its readers have for so many years borne with him.—W. M. B.

WOUND DIPHTHERIA. DIPHTHEROIDS.

For some years we have been interested in noting the behavior of wounds that became infected by diphtheria. Reporting our observations in three cases, S. K. Levy published two years ago (AMERICAN JOURNAL OF SURGERY, August, 1917) a summary of the entire subject. In that article, and in an editorial in the same issue, were emphasized

the following clinical deductions, suggested chiefly by our own experience: The manifestations of wound diphtheria are neither constant nor characteristic; a grayish or whitish membrane is not always present; any discoloration or membrane, an otherwise unexplainable necrosis, even only an unusual odor, appearing in a wound, should arouse a suspicion of the possibility of infection by b. diphtheriæ; the patient may be overwhelmed by accumulating toxins before the changes in a previously normal-appearing wound are accounted for or, sometimes, even before these changes attract serious attention. In one of our cases the yellow membrane disappeared, the entire wound becoming gangrenous and distinctly green, the gangrene extending as a black area in the adjacent skin.

These observations were in children. It was interesting to note that in adults wound diphtheria may also present variations from the membrane type. In a base hospital, at a time when there were sporadic cases of nasal and pharyngeal diphtheria, we noted the occasional development on previously clean, granulating wounds of soldiers, of characteristic diphtheric membranes. In addition to these, however, there were two cases of what we believe were true infections by Klebs-Loeffler bacilli, in which no membrane whatever appeared. Previously clean, actively granulating wounds, ceased to contract; the granulations "melted away," exposing the underlying muscles, which, in one case, showed here and there minute *green* areas of necrosis; the temperature was elevated for a few days; a narrow zone of redness and swelling appeared in the surrounding skin; then the inflammatory reaction subsided and the wound slowly contracted, without granulating, the organisms persisting in the wound —despite all antiseptic treatment—until it was completely cicatrized!

While in children the infection of a wound by diphtheria is often quickly fatal, the soldiers whom we have seen with the same wound infection were at no time alarmingly sick, even though the membrane was over a large, granulating thigh stump.

At the base hospital where these cases were seen a considerable number of wounds was found to contain organisms morphologically and culturally identical with the Klebs-Loeffler bacillus. Some of these wounds were examined for diphtheria because they presented suspicious changes of one kind or another; some merely because they were ward "contacts." Not a few of the wounds in which the organism was found showed no variation from the appearance of normal granulations; some exhibited a translucent colorless or grayish film; in some the granulations had changed somewhat in color or size and the healing process had become sluggish. Toxin tests from the bacilli in one of these wounds proved negative; and we are prepared to believe that in most of these cases the bacteria found were only *diphtheroids*.

Reporting "An Outbreak of Diphtheric Wound Infection among Returning Soldiers" (*Journal of the Am. Med. Assn.*, September 8, 1917) Fitzgerald and Robertson, of the Canadian Army Medical Corps, record that between May 20th and June 7th, 1917, among sixty-seven men with suppurating wounds, from which cultures were made, "thirty-two were found to be suffering from b. diphtheriæ infection"!

Adami and co-workers in a study of "Diphtheria and Diphtheroid Bacilli in Open Wounds," (*Canadian Medical Association Journal*, September, 1918) express the opinion that most of the cases recorded by Fitzgerald and Robertson were instances, not of diphtheria, but of wound contamination by diphtheroids. They demonstrated that diphtheroids have not only the same morphologic but may also exhibit the same cultural peculiarities as the Klebs-Loeffler bacillus; and that the only decisive differentiation is by test of toxin production.

Recently Hartsell and Morris, of the U. S. Army Medical Corps, made "A Report of Sixty Cases of Wound Diphtheria" in a base hospital (*Journal of the Am. Med. Assn.*, May 10, 1919). These were findings in routine wound cultures! The authors state that in no case was there any systemic symptom; twelve per cent. showed a gray membrane; "about one-half showed only a faint grayish discoloration of the granulating surfaces which under ordinary conditions would have passed unnoticed; about 6 per cent. looked absolutely healthy." As in the Canadian report, only one culture was tested for virulence. It proved toxic, as it did in the single instance from the series of Fitzgerald and Robertson; but both sets of authors failed to state whether the test was made from the culture of a wound clinically diphtheric or from one of the wounds examined as a routine.

The conclusion seems inescapable that most of the cases recorded by Hartsell and Morris were also instances, not of wound diphtheria, but of infection by diphtheroids.

While these two reports have the merit of drawing attention to diphtheric wound infection, it is to be regretted that they put on record a much higher incidence of such infections in war wounds than has actually existed. It is unfortunate, too, that

they so confuse the clinical notion of wound diphtheria for, as we have pointed out, this does occur quite atypically. These publications may lead, on the one hand, to the unnecessary isolation of some cases and, on the other hand, to the more serious mistake of dismissing as a "diphtheroid infection" a case of true wound diphtheria without a characteristic membrane.

The diphtheroids are regarded as non-pathogenic. Some of them, however, appear to interfere with normal wound healing. Further observations may even demonstrate that certain varieties are pathogenic.—W. M. B.

Surgical Sociology

Ira S. Wile, M.D., Department Editor.

BLINDNESS.

The advances made in the protection of workers from accidents tending to injure eyesight were emphasized during the period of speeding up attendant upon war. In fact, the entire movement for the conservation of vision has progressed very rapidly during the past five years. Fortunately, war itself has been responsible for only a small number of men lacking in both eyes, and the number deprived of one visual organ was not large among the Americans. A certain meed of pity is extended to those who have suffered damage to vision in the demonstration of their patriotism, but their loss is no more depressing to them or more damaging to society than similar conditions existent among the countless other persons robbed of eyesight through accident or disease.

Fortunately, the attitude towards the blind has undergone many alterations. The blind man is not to be regarded as an object of pity, merely deserving a pittance or a charitable contribution. He is to be recognized as a man capable of fulfilling his destiny, despite a handicap. He is to be given an opportunity to develop his normal self-respect and to retain his individuality, supported by the consciousness of independence achieved through effort. The rehabilitation of the blind is a matter of the utmost importance, and merits greater emulation in connection with the every-day living of those unfortunate enough to suffer from complete visual disability.

Accidents and injuries, together with sympathetic ophthalmia, constitute the single greatest cause of blindness, being responsible for more than one-eighth of the entire amount in the United States. If one adds to this the blindness arising from poisons, foreign substances in the eye, exposure to heat, and from eye strain in industry, the percentage is raised so that one may state that a little over one-sixth of all blindness is occasioned by external injury or from causes other than disease.

In a most excellent volume, *"The Blind,"* (The Macmillan Co., 1919), Harry Best, Ph. D., has summed up the general knowledge pertaining to blindness. He presents not merely statements of their general condition, but excellent discussions of blindness and its prevention, the provision for education for the blind, children and adult. He describes, at length, the material provision that is being made for those afflicted with blindness and details the various types of organizations interested in their welfare.

The single chapter devoted to blindness and accidents merits a reading by ophthalmologists and surgeons, as well as by those interested in the social welfare of men. Here one grasps the significance of industrial hazards that are involved in work with abrasive wheels, clipping, cutting, or driving metal, hewing or carving of minerals, cutting wood, sand blasting, the handling of explosives and the dangers from the bursting of boilers or gauges or the breaking of belts. The dangers of powerful glares and intense heat, the likelihood of injury by hot or noxious chemical substances, particularly those used in connection with work with chemical and explosive industries are made patent.

"By reverting to the general table giving the several causes of blindness according to the census returns, we learn that nearly one-fifth (18.3 per cent) of all blindness from accidents and injuries is due to explosives, including those in mines and quarries, those in construction and similar work, and those from bursting shells in military actions; nearly one-eighth (11.8 per cent), to firearms; nearly one-tenth (8.9 per cent), to flying objects (not occurring in explosions); 5.9 per cent, to falls; 5.7 per cent, to cutting and piercing instruments; 4.1 per cent, to burns; 2.2 per cent, to animals; 2.2 per cent, to blows to the head; 2.0 per cent, to explosions not referred to above; 1.6 per cent, to explosions of a nature not indicated; 1.3 per cent, to unfortunate results of operations; 0.8 per cent, in mines and quarries; 0.4 per cent, to machines; and 34.8 per cent, to miscellaneous causes. Of blindness resulting from foreign substances in the eye, about half is due to acids and other substances of chemically destructive nature, and half to dust and other particles. Of that resulting from poisoning, 22.3 per cent is to be ascribed to wood al-

cohol; 18.5 per cent, to tobacco; 17.6 per cent, to chronic lead poisoning; 11.1 per cent, to alcohol other than wood alcohol; 8.3 per cent, to chronic occupational poisoning other than from lead; and 22.3 per cent, to other forms of poisoning." In the way of prevention it is important to realize that types of accidents vary somewhat in their most frequent occurrence with the period of life. "Injuries from cutting and piercing instruments are most common in the early years of childhood, being the leading single cause among accidents from the first to the ninth year, after which time they decrease more or less rapidly. Injuries from falls also happen most often in this period. Injuries from firearms are of greatest frequency in the late years of youth, being the foremost cause from the tenth to the nineteenth year, after which there is a gradual decrease. Injuries from explosives show the largest proportions in youth and early and middle adult life, or during its most active working period, representing from the twentieth to the fifty-fourth year the chief cause of blindness from accidents. Injuries from flying objects and from burns, though fairly constant through life, reach their highest mark towards middle life, those from the former being also the leading cause after the fifty-fifth year. Blindness from exposure to heat, from foreign substances in the eye, and from poisoning are, like injuries from explosives, of greatest occurrence during the working period of life. Blindness from strained eyes increases with advancing years."

These few figures are most suggestive of the lines along which attention must be directed in order to aid in the work of conserving vision. Basic figures are always requisite for framing programs. Legislation can be effective only when soundly founded upon facts. The gleaning of statistical material from all sources in the country is an essential prerequisite for visualizing the sources of accidents to the eyes. The establishment of divisions for receiving reports of accidents of all kinds, and of tabulating results is most necessary in order properly to devise laws and ordinances for the protection of the young and the old, in civil or industrial life.

While blindness is receiving more attention than ever before and while the community conscience is being fortified to accept blindness at a different valuation than heretofore, there is an imperative necessity for establishing every safeguard for the elimination of those unnecessary accidents which rob individuals of their highest potentials and tend to destroy the full social value of human beings. If the prevention of blindness can strike the same sympathetic cord in the community that is struck by the sight of the afflicted, the conservation movement would receive a new impetus, and the need for organizations for the conservation of vision would be greatly decreased.

"MODERN MEDICINE."

The developments of modern medicine are to be recorded in a journal to which, in new form, we give cordial welcome. *Modern Medicine,* in most attractive garb, steps into the field of medical literature, pointing out new horizons in health to be explored and expanded. Its aim is to discuss "the application of medicine and allied sciences to industrial efficiency and national health." Appearing monthly, it is to reflect the progress in medicine and health and present to the medical profession a résumé of the numerous problems in health administration and industrial and social health.

The basic thought underlying *Modern Medicine* is that in a world of ideas, the right to be well is by no means as important as the idea that people *must* be well, insofar as the science of medicine can make it possible. The new conceptions of medicine and surgery are swept along on a current of social progress, and those who would be consecrated by baptism need but to go toward the stream.

The initial number (May, 1919) is most promising, and, as an earnest of intention, it creates hopes and expectations, the realization of which will enrich medical knowledge. We bid our contemporary warmest greetings, and shall look to it for a spirit of cooperation that must shape the destiny of medicine in giving voice to the underlying principles of health conservation.—I. S. W.

Book Reviews

Surgical Treatment. A Practical Treatise on the Therapy of Surgical Diseases for the Use of Practitioners and Students of Surgery. JAMES PETER WARBASSE, M.D., Fellow of the American College of Surgeons, American Medical Association, American Academy of Medicine, New York Academy of Medicine; Surgeon to the Wyckoff Heights Hospital, Brooklyn, New York; Formerly Attending Surgeon to the Methodist Episcopal Hospital, Brooklyn, New York. In three octavo volumes with 2,400 illustrations and a separate index volume. *Volume III,* 861 pages; 864 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1919.

In the review of volumes I and II (May issue) we called attention to the general character and unique features of this large, comprehensive, thoroughly interesting and altogether attractive work.

Volume III continues the surgery of the *abdomen* (appendix and bile tract), and deals with that of *hernia,*

the rectum and anus, the pelvis, the genito-urinary tract, the female generative organs, the extremities (not including fractures and dislocations), *plastic and cosmetic surgery* and such miscellaneous subjects as the surgical therapy of the *new-born, burns and injuries by electricity, radiation and gas poisoning, electricity, heliotherapy, radiation, massage,* etc., in surgical treatment, *first aid,* and *bandaging.*

To these is added a chapter on the *economics of surgical treatment,* written in Warbasse's characteristically earnest and convincing (and always elegant) style, in which he urges the socialization of surgery (and medicine), the separation, in individuals, of the specialties of diagnostics and operative surgery, and the establishment of diagnostic clinics. This is a theme on which the author has often written; indeed he may be said to have been the torch bearer along a path on which we have already made some footsteps. The growth of group medicine, on the side of the profession, and legislative discussions and enactments, on the side of the community, suggest that the socialization of medical practice much in the manner that Warbasse has urged it, may come to pass before many years.

The production of a work on surgical treatment of such a comprehensive character as this, including as it does, the surgery of the eye, ear, and gynecology, was a great undertaking for a single author. It was a labor considerably greater than the preparation of a treatise on operative surgery only, for Warbasse has written his work not only for the expert surgeon, capable of performing any indicated procedure but also "in the interest of the surgical patient" and "not to glorify surgery" —for the less experienced. With this purpose constantly in view he has described not only the ideal procedure, for the skilled specialist, but also less hazardous and non-operative measures for the less skilled.

Each volume carries its own index. The combined index for the three volumes, bound separately, is very convenient.

Surgical Aspects of Typhoid and Paratyphoid Fevers. Founded on the Hunterian Lecture for 1917, amplified and revised. By A. E. WEBB-JOHNSON, D.S.O., M.B., Ch.B. (Vict.), F.R.C.S. (Eng.); Temporary Colonel, Army Medical Service; Consulting Surgeon British Expeditionary Forces, France; Hunterian Professor of Surgery, Royal College of Surgeons of England; Assistant Surgeon to the Middlesex Hospital. With Foreword by LIEUT.-GEN. T. H. GOODWIN, C.B., C.M.G., D.S.O., Director-General, Army Medical Service. Duodecimo, 190 pages, illustrated. London: HENRY FROWDE, HODDER & STOUGHTON, Oxford University Press, 1919.

The appearance of this small volume immediately calls to mind the earlier and larger one on "The Surgical Complications and Sequels of Typhoid Fever," by W. W. Keen. It is a tribute to the completeness of that classic work that this modern review of the subject adds practically nothing to what Keen produced twenty-one years ago!

Neoplastic Diseases. A Text-Book on Tumors. By JAMES EWING, A.M., Sc.D., Professor of Pathology at Cornell University Medical College, New York City. Octavo, 1,027 pages, 479 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY 1919.

With very few exceptions the only comprehensive books on the study of tumors are written in foreign languages This, however, is not the only reason why Ewing's book makes an especial appeal to us. There is no book on tumors in any literature quite like it, either in the fulness and comprehensiveness of its contents, or in the originality of its viewpoint. Ewing discusses not only the pathology of each type of tumor down to its minutest details, but also the morbid phases as modified by the regional distribution. The latter is a viewpoint that is entirely lacking in other books on the general morphology of tumors, and we need hardly say it invokes aspects of fundamental clinical importance. In addition Ewing devotes considerable space in the text to comment upon some of the more important clinical features, not only in regard to the type of the tumor but also in its regional distribution. This represents a correlation between pathology and clinical medicine that is refreshing in the works on pathology.

The discussion maintains the high plane that one would expect in Ewing's publications. The text reveals a fine combination of all available facts and a wide personal experience. Ewing's temperate critique is everywhere present and nowhere have we discovered a rash statement or a misquotation. The illustrations are nearly all original and of superb quality. This is a book of which American medical literature may justly be proud.

An Outline of Genito-Urinary Surgery. By GEORGE GILBERT SMITH, M.D., F.A.C.S., Genito-Urinary Surgeon to Out-Patients, Massachusetts General Hospital. 12mo; 301 pages; 71 illustrations. Philadelphia and London: W. B. SAUNDERS COMPANY, 1919.

This is a very practical little volume of diseases of the genito-urinary tract. All of the subjects discussed—and these include the diseases of the entire tract from urethra to kidney—reflect the most modern conception and practice in the care of these illnesses. While intended to relate to the male genito-urinary tract, mention is made of the differences existing in the female, especially with regard to the female urethra. The operations described are done so very lucidly and are illustrated with appropriate drawings. Each chapter is followed by a list of the most important references pertaining to the subject.

Military Surgery of the Ear, Nose and Throat. *Medical War Manual No. 8.* By HANAU W. LOEB, M.D., Major, Medical Reserve Corps, U. S. A. Philadelphia and New York: LEA & FEBIGER, 1918.

A new member of the war manual series is the eighth, Military Surgery of the Ear, Nose and Throat, by one of the foremost American specialists in this field. Although it treats the subject matter from an angle other than that of the civilian practitioner it is still a valuable little book for any one engaged in the practice of these specialties. The general practitioner will find it a help, also, when confronted with some injury of the ear or upper air passages.

The first part of the little book deals with injuries of the ear, taking them up in regular order, beginning with traumata of the external ear and proceeding toward the labyrinth. There is also a section on the re-education of the deaf and one covering the subject of speech defects.

Injuries of the nose and sinuses occupy a short chapter. Injuries of the throat, esophagus and trachea are treated at greater length.

There is a chapter on malingering, very valuable for those who are obliged to examine the hearing of people either for military or industrial purposes, and one on the ear and aviation, together with sections on the standardization of tests and, what is perhaps even more important, standardization of examiners.

There is a very complete bibliography at the end of the manual which will be found most convenient by any one wishing to follow, more completely, the references mentioned in the text.

Progressive Medicine. A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by HOBART AMORY HARE, M.D. Assisted by LEIGHTON F. APPELMAN, M.D. *Volume XXII,* No. 2, June, 1919. Philadelphia and New York: LEE & FEBIGER.

This number, of 329 pages, reviews the recent literature of the following subjects: *Hernia,* by Wm. B. Coley; *Surgery of the Abdomen,* by A. O. Wilensky; *Gynecology,* by John G. Clark; *Disorders of Nutrition and Metabolism, the Glands of Internal Secretion, the Blood and Spleen,* by Elmer H. Funk, and *Ophthalmology,* by Wm. F. Hardy.